

Davis, of Harvard College. The National Academy, which constitutes the trustees of the Bache fund, has granted 200 dollars for this work. Upwards of 400 observers are co-operating in the inquiry, and as regards one thunderstorm reports from 203 observers were received. The discussion of the important results already obtained will by and by appear in the *Bulletin*. A thorough investigation of thunderstorms, including the falls of rain, snow, and hail, with their successive propagation over the New England States, will be a highly important contribution to meteorology; and for the results of the investigation as it advances we shall look with much interest to the proceedings of this Society, which is among the very youngest but most active of the meteorological societies.

NOTES

WE much regret to record the death of Sir Frederick J. O. Evans, R.N., K.C.B., F.R.S., late Hydrographer of the Admiralty, in his seventy-first year. Next week we hope to give a notice of Sir Frederick's career.

HIS EXCELLENCY the Minister of Agriculture, Industry, and Commerce in Italy, in order to favour and facilitate the application of remedies in solution, powder, or mixture against the cryptogams and parasites of cultivated plants, and especially the use of milk calx against *Peronospora* (mildew) of the vines, by a decree of November 9 will open an International Exhibition with prizes for pumps, watering and pulverisation implements. The Exhibition will take place at Conegliano in the Royal School of Vine-Culture and Oenology. The following prizes will be awarded:—1 gold medal and 500 lire; 3 silver medals with 150 lire each; 5 bronze medals. The Ministry of Agriculture will also purchase prize implements to the value of 1000 lire for distributing to the Agrarian Government depots, practical and special agriculture schools. Exhibitors must apply for admission to the "Direzione della R. Scuola di Viticoltura ed Enologia in Conegliano" not later than February 22, 1886. The demand must contain a short description of the instruments and the price of each object to be exhibited.

It is stated that the Mexican Government are about to establish a meteorological station among the highest mountains in Mexico, at an elevation of nearly 20,000 feet above the sea-level. Access to such a place must be always precarious, and frequently impossible for a long time together, hence it is necessary to make exceptional provision for rendering the instruments almost independent of human attention and supervision. The necessary apparatus is being constructed by Hottinger, of Zurich, and, as far as possible, all the instruments are being made to go for a year without stopping.

AT the monthly meeting of the Council of the Sanitary Assurance Association arrangements were completed for the series of free lectures to be given by the Association at the Parkes Museum during January and February next. The first lecture is to be by Prof. Roger Smith, on "A Damp House," on Wednesday evening, January 20, and on the following Wednesday Mr. F. B. Jessett, F.R.C.S. Eng., will lecture on "Preventible Diseases."

THE science certificates and prizes obtained by the students attending evening classes established by the Birmingham School-Board were distributed by Prof. Lapworth, LL.D., F.G.S., in the large hall of the Icknield Street School, on December 14. The report of the year's work, by the Board's demonstrator, Mr. W. J. Harrison, F.G.S., showed that some 5000 children are now receiving elementary instruction in science in the day-schools, while 500 teachers attend the evening classes. Prof. Lapworth afterwards delivered a very able and scholarly address.

In consequence of the rapid growth of the system of science teaching, the Board has just resolved to enlarge the chemical laboratory at a cost of about 700*l*.

THE Clothworkers' Company have promised to raise their annual subscription to the City and Guilds of London Institute from 3000*l*. to 4000*l*., provided the Corporation and Associated Livery Companies raise the total of their annual subscriptions to the Institute from 24,500*l*., the present amount, to 30,000*l*. This is probably the first step in response to Lord Selborne's recent appeal to the City Companies, on the double ground of public duty and self-interest, to add still further to their already munificent contributions to technical education. The capital expenditure on the building and equipment of the Central Institution, Exhibition Road, the Finsbury Technical College, and the South London School of Technical Art has been nearly 140,000*l*., but, as the late Lord Chancellor pointed out, the Companies cannot be said to have discharged their obligations to technical education, until the Institute wants no more pecuniary support and moral countenance. Until this distant goal is reached, said Lord Selborne, they remain in its debt, notwithstanding their already vast donations.

THE statement, according to *Science*, that one of the chief applications of composite photography will be in the direction of producing more reliable portraits of representative men by combining the testimonials of individual artists, will probably be accepted by all who have followed the short but interesting career of this new invention. The suggestion that, by combining the individual conceptions of several artists, one would obtain a more reliable portrait than any of the components, was near at hand. The first such application was made by Mr. Galton himself. He made a composite of six medallion heads of Alexander the Great, and naturally claimed for the composite the combined authority of all the artists. In this way *Science* has recently come into possession of a new Shakespeare. In the case of Shakespeare the diversity amongst the several originals is strikingly evident, and thus a composite was needed to give a characteristic, individual, natural face. This suggested to Mr. W. C. Taylor the application of the same process to Washington's portraits. He has grouped the several portraits into three groups, owing to the differences of position of the portraits, and the accuracy of the work is well shown by the fact that the agreement amongst the resulting three composites is very close, while the originals show every shade of individual differences. These portraits were first published in the *Journal of the Franklin Institute*, and are given on a new and enlarged plate in the number of *Science* for December 11.

IN pursuance of a resolution passed at the Medical Congress on Brain Diseases, held during the past summer at Antwerp, by which it was suggested that local conferences should be held to draw up trustworthy international tables of statistics on insanity, a Conference of Austro-Hungarian specialists will be held at Vienna on the 26th and 27th inst., with the object of revising and extending the nomenclature of mental disorders. Invitations to the Conference have been issued by four leading doctors of Vienna.

THE work of spawning Salmonidæ at the establishment of the National Fish-Culture Association at Delaford Park has commenced, and it is expected that a large number of ova will be obtained. The establishment, which was opened in the early part of the present year, is now in excellent order, and all the fish that have been reared are doing well. It has been found necessary to increase the number of breeding-ponds in view of the extensive nature of the operations to be carried on next year.

THE new aquarium for the Indian and Colonial fish at South Kensington is now in course of construction and will be on view

at the next Exhibition. The tanks are to be erected at the back of the present aquarium, which will be maintained as heretofore, but as the fish to be exhibited require careful and special treatment no connection can exist between the two aquaria, which will be quite separate. It is to be hoped that the collection, when formed, will not be allowed to collapse at the termination of the forthcoming Exhibition, but that it will be maintained as a permanent institution, for an aquarium of foreign fish is much needed in London.

THE last issue of the *Izvestia* of the Russian Geographical Society contains a very interesting communication, by M. Yadrintseff, on the beginnings of settled life, being a contribution to the history of the rise of civilisation among the Ural Altayans. The paper is a *résumé* of an elaborate work on the subject which we hope soon to see published in the *Memoirs* of the West Siberian Geographical Society. M. Yadrintseff has had at his disposal very extensive materials, derived both from his own intimate acquaintance with the life of the native Siberians, and from a careful study of their history. Siberia is really one of the best fields for studying those intermediate phases of life which ultimately lead to the nomads becoming settled. Not only do the inhabitants of Siberia show us all possible stages in the transition from a nomadic life to that of settled agriculturists, but all these stages may also be studied under the varied aspects they assume when the modification goes on in different physical and geographical conditions, for example, in the forest regions, in the steppes, in the narrow valleys of the hilly tracts, and on the broad surfaces of the plains. It is easy to foresee what a valuable mass of information could be gathered in Siberia on this subject by an observer so well acquainted with his mother-country as M. Yadrintseff is; but it would be impossible to sum up in a few words the varied results to which the study has brought the author. The disappearance of entire civilisations like those of the Ural Altayans who immigrated into the plains of Siberia from the hilly tracts of the Altay, only add to the already great interest of the subject. We notice, moreover, the importance justly attached by the author to those intermediate phases which the nomad goes through when he abandons his former mode of life, and, by narrowing the region of his migrations, by staying at a permanent wintering place, and by merely migrating from a permanent summer dwelling to a winter dwelling, finally becomes a settled agriculturist; the relative facility with which this modification is undergone by the inhabitant of a forest region as compared with the difficulties met with by an inhabitant of the steppes; the similarity between many Siberian indigenes now passing through these intermediate phases of civilisation and the Germans at the time of Tacitus; and very many minor conclusions, all possessing great interest.

AMERICAN papers state that an aërolite or meteoric stone, which caused a loud detonation, heard throughout the greater part of Washington and Alleghany counties, Pa., on Saturday, the 3rd inst., fell upon the farm of Mr. Buckland, in Jefferson township, Washington county, near the West Virginia line. A mail carrier states that looking up he saw, moving high above him, a huge mass, which he described as resembling a great coal of fire as large as the largest barn he ever saw. There appeared to be attached to it an immense flame of a deep red colour, which tapered off into a darker tail. Instantly the noise which accompanied it ceased; the fire-like appearance, the flame, and the tail disappeared, and in their stead the stone assumed a whitish hue, which it retained until it passed out of sight. When the stone fell it broke into three pieces, but did not penetrate the earth to any great depth, as two-thirds of it remained above ground. It is grayish in colour, with a succession of red streaks, is irregular in form, and at least fifty feet in diameter.

A CORRESPONDENT of the *Times*, referring to Sir John Lubbock's discovery of much greater longevity of ants than has hitherto been believed, thinks that the same may be true with regard to the butterfly, although the common notion is that the butterfly's life is a short and merry one. The correspondent, who writes from Bournemouth, then relates the following incident:—"On August 15 last a fine peacock butterfly flew into our house through the garden door, and was caught and put under a large bell glass. On the following day another came in, and was also put under the glass. They were supplied daily with fresh flowers and a few drops of new honey, which they evidently much enjoyed. No. 1 died during a suddenly cold night, No. 2 lived until yesterday, December 14. Whenever the sun shone upon their cage, which was placed on a table near a large window of plate glass, they opened their beautiful wings and flew about vigorously, occasionally resting on a flower to thrust their trunks deeply into its corolla, or standing over and sucking up the drops of honey. The extraordinarily sensitive nervous system of these little beauties was indicated by the most rapid vibratile trembling of the wings directly the sunlight or the scent of fresh flowers reached them. When the sun was not out they usually remained perfectly still, with their wings closed, especially selecting to hang on the under side of a leaf. They showed great intelligence in distinguishing the freshly-gathered flowers and in deciding that honey was the right thing to eat, and I have seen one of them scramble with considerable difficulty across his cage through a tangle of leaves and stalks, determined to get to a particular leaf on which he wished to hang. After some unsuccessful attempts to reach it, he hooked it down with one foot, then held it with another, until he could get the rest of his legs upon it, having done which he appeared satisfied, shut up his wings, and hung himself upon it, topsy-turvy, to rest. If he failed to do what he wished with one leg, he immediately tried another, appearing to think that, having six at his disposal, it was foolish to waste much time on any one. But he only used his most anterior pair on very special occasions. How long each butterfly had lived before it was caught I do not know, but No. 2 lived in its glass cage 121 days."

THE amount of carbonic acid in the air has recently been measured by MM. Spring and Roland in a series of 266 determinations in the course of one year, the place being at Liège, in Belgium, having on one side a busy centre of the iron industry and on the other an agricultural district. The average obtained was 5.1258 parts by weight and 3.3526 parts by volume in 10,000 parts of air. This is considerably more than the air of Paris contains (4.83 and 3.168 respectively). Besides the plentiful carbonic acid from those iron-works, there is a large emission of the gas from the ground, which is rich in coal; indeed, cases of local heating often occur, with withering of the plants. To the relative abundance of carbonic acid the authors attribute the greater heat of Liège as compared with the surrounding regions, as the gas strongly absorbs heat-rays and limits radiation by night. A return of cold in May is thought to be due to the unfolding leaves diminishing the amount of CO₂, so that the nightly radiation is increased. The amount of CO₂ is considerably increased by a fall of snow (to 3.761 ten-thousandth parts by volume), except when the earth is already covered with snow. Cloud also gave an increase (3.571). The winter months gave a greater amount than the summer. The difference between day and night was but slight, nor had temperature nor rainfall a decided effect; but the rain in thunderstorms increased the amount. As to wind there were three maxima—viz. with north, north-west, and south-south-west winds, corresponding, apparently, to the directions of industrial centres. The CO₂ diminished in high winds and increased with a high barometer. These researches are the subject of a recent memoir to the Belgian Academy.

THE average heat-value of well-purified coal-gas at constant volume has been recently determined by M. Witz (*Ann. de Chim. et de Phys.*) as about 5200 calories per cubic metre at 0° and 760 mm. when the water formed is fully condensed. This value, got from a great variety of experiments with gas from different works, appears to make the generally-accepted figure of 6000 calories about 15 per cent. too high, and the calculation of gas motors is here concerned. The heat-value of the gas from one and the same works varied in the course of a year from 4719 to 5425 calories, which was more than the variation between different works. The influence of temperature and external pressure was not perceptible. The operations for purifying gas diminish the heat-effect, sometimes as much as 5 per cent. The gas of the last hour of distillation is (contrary to the usual view) less rich than that of the first hour. Dilution with oxygen lessens the heat-value; but in dilution with air, curiously, no such effect was observed; the heat of combustion was the same with six or with ten volumes of air.

IN his investigations of the changes of level of inland lakes (known as *seiches*), Prof. Forel has arrived at the simple formula $t = l / \sqrt{gh}$ for those movements, in which t expresses the time, in seconds, of a half oscillation of a uninode *seiche*, l , the length, and h , the mean depth of the cross-section of the lake in which the variation is observed. This formula holds good for the lakes of Neuchatel, Brienz, Thun, Wallenstadt, and Geneva. An interesting confirmation of it is found by M. Forel in observations made by Mr. Russel with a limnograph on Lake George in New South Wales. This instrument had recorded 33 very regular *seiches* on the lake this year, and the duration of a whole oscillation proved to be 131 minutes. Now the length of the lake being 28,962 metres, the above formula gives, for the mean depth, 5'536 metres, or 18'1 feet. Mr. Russel states that the mean depth is between 15 and 20 feet.

THE prevailing direction of the winds on the shores of the Black Sea and the Sea of Azov has been recently studied in great detail, and in connection with the recent progress of meteorology with regard to wind generally, by M. Spindler, who has published his work, with maps, in the Russian *Maritime Review* (*Morskoy Sbornik*). Four maps show the prevailing direction of the wind at 7 a.m. and at 1 p.m. during the four seasons of the year. During the winter a notable difference between the prevailing direction at these two hours of the day is seen only on the eastern shore; while in the spring and summer nearly everywhere on the Russian coast of the Black Sea these two directions differ by 90°, and at some places they are quite opposite to one another, thus showing that the predominating influence of the currents of air depend upon the different heating of land and sea.

IT is reported from Kara-hissar, in Asia Minor, that an earthquake shook that neighbourhood on Tuesday, December 2. In the hamlet of Kemin the earth opened for a length of about 40 feet, and from 3 to 5 feet wide.

THE last earthquake shock in Algeria was felt at Blidah on December 13, at 5 a.m. Subterranean noises were heard. The first shock, in Hussein Dey, near Algiers, was felt on December 3, at 8h. 23m. a.m. This has been proved by the stopping of a clock in a distillery.

How great are still the numbers of Carnivora in Finland may be seen from the following figures, given in the last issue of the "Statistical Yearbook" for Finland. In 1882 not less than 85 bears, 128 wolves, 407 lynxes, 4005 foxes, 76 gluttons, 240 river otters, 148 martens, 1583 ermines, and 3947 carnivorous birds were killed, for which an aggregate of 1646*l.* was paid in premiums by the Government. The ravages occasioned by Car-

nivora the same year were immense: they are estimated at 274 horses, 846 horned cattle, 5246 sheep, 168 pigs, 119 goats, 1681 reindeer, and 2366 domestic fowls. The greatest number of bears were killed in Viborg and Uleåborg (respectively 33 and 30), while most wolves were killed in the more densely-peopled Government of Tavastehuus.

AT the meeting of the Royal Physical Society of Edinburgh, held December 16, the following office-bearers were elected, viz.—President: Prof. William Turner, F.R.S.S.L. and E., Edinburgh University; Vice-Presidents: John A. Harvie-Brown, F.R.S.E., Rev. John Duns, D.D., Prof. J. Cossar Ewart, F.R.S.E.; Secretary: Robert Gray, V.P.R.S.E.; Assistant-Secretary: John Gibson; Treasurer: Charles Prentice, F.R.S.E.; Librarian: William Evans Hoyle, F.R.S.E.; Council: John Hunter, F.C.S., Robert Kidston, F.G.S., A. B. Herbert, Prof. James Geikie, F.R.S., G. Sims Woodhead, F.R.C.P.Ed., Hugh Miller, F.G.S., Arthur W. Hare, M.B., R. Milne-Murray, M.R.C.P.E., H. Moubray Cadell, B.Sc., R. H. Traquair, F.R.S., R. Sydney Marsden, D.Sc., F.R.S.E., Benjamin N. Peach, F.G.S., F.R.S.E.

THE additions to the Zoological Society's Gardens during the past week include a Macaque Monkey (*Macacus cynomolgus*) from India, presented by the Rev. Spencer Fellows; a Black-backed Jackal (*Canis mesomelas*) from South Africa, presented by Mr. J. Robson; a Slender-billed Cockatoo (*Nymphicus tenuirostris*) from Australia, presented by Mrs. Sturt Cavell; a Kestrel (*Tinnunculus alaudarius*), British, presented by Mr. T. E. Gunn; three Wild Ducks (*Anas boschas*), British, presented by Mr. C. T. McNiven; a Lapwing (*Vanellus vulgaris*), British, purchased.

OUR ASTRONOMICAL COLUMN

TOTAL SOLAR ECLIPSE, 1886 AUGUST 28-29.—The eclipse will be total throughout the Island of Grenada. The Greenwich mean times of beginning and ending of totality for any point in the island may be found from the formulæ:—

$$\begin{aligned} \cos w &= -4.99267 - [1.77822] \sin l + [1.26284] \cos l \cos (\lambda + 48^\circ 13' 5'') \\ t &= 1h. 12m. 41.7s. \mp [2.04698] \sin w - [3.24330] \sin l \\ &\quad - [3.4970] \cos l \cos (\lambda + 82^\circ 53' 0''), \end{aligned}$$

where l is the geocentric latitude of the place, λ its longitude from Greenwich, taken negatively, and the quantities in square brackets are logarithms; upper sign for beginning, lower for ending.

For long. 4h. 6m. 20s. W., lat. $11^\circ 59' 5''$ N. near the southern extremity of the island, totality begins at 19h. 11m. 0s. local mean time, and continues 3m. 42s. $\odot$'s altitude 20° .

In long. 4h. 6m. 40s. W., lat. $12^\circ 15' 0''$ N. near the northern extremity of the island, totality begins at 19h. 10m. 37s. local mean time, and continues 3m. 37s.

At Carriacou I. (Grenadines)—

Totality commences at 19h. 11m. 45s. local M.T.

Duration 3m. 21s.

Sun's altitude 20°

FABRY'S COMET.—Dr. H. Oppenheim continues his ephemeris of this comet in the *Dun Echt Circular*, No. 102, as follows:—

<i>Ephemeris for Berlin Midnight</i>										
1885		App. R. A.			App. Decl.			Log. Δ		Brightness
		h.	m.	s.						
Dec.	28 ...	23	48	29 ...	+ 20	52' 6"	...	0.0849	...	1.6
	29 ...		47	14 ...		54' 8"				
	30 ...		46	2 ...		57' 3"				
	31 ...		44	52 ...	21	0' 0"				
	32 ...		43	45 ...		3' 0"	...	0.0850	...	1.8

β CYGNI OR 6 CYGNI?—M. Flammarion in the December number of *L'Astronomie* falls into a curious confusion with regard to these stars. Dr. Ball had found the parallax of B.A.C. 6579 (B) to be $+0''.482 \pm 0''.054$, and following Bode's numbers called the star β (B) Cygni. Unfortunately, however, M. Flammarion supposed Dr. Ball referred to Flamsteed's β Cygni, which is β Cygni, and based an article on the supposed determination